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STRAWBERRY LAKE, LIVINGSTON COUNTY, MICHIGAN

Pacific Northwest Environmental Research Laboratory

Prepared for:

National Environmental Research Center
Michigan National Guard
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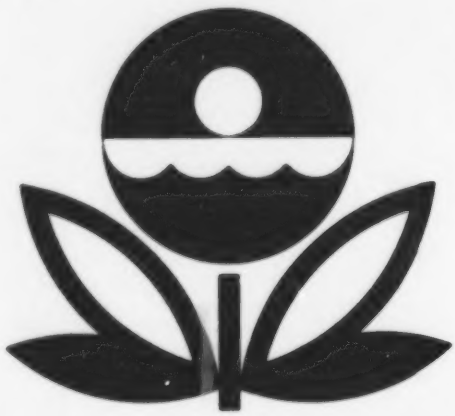

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16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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REPORT
ON
STRAWBERRY LAKE
LIVINGSTON COUNTY
MICHIGAN

EPA REGION V

WORKING PAPER No. 213

WITH THE COOPERATION OF THE

MICHIGAN DEPARTMENT OF NATURAL RESOURCES

AND THE

MICHIGAN NATIONAL GUARD

MAY, 1975

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Michigan Department of Natural Resources for professional involvement and to the Michigan National Guard for conducting the tributary sampling phase of the Survey.

A. Gene Gazlay, former Director, and David H. Jenkins, Acting Director, Michigan Department of Natural Resources; Carlos Fetterolf, Chief Environmental Scientist, Bureau of Water Management; and John Robinson, Chief, Dennis Tierney, Aquatic Biologist, and Albert Massey, Aquatic Biologist, Water Quality Appraisal Section, Bureau of Water Management, Department of Natural Resources, provided invaluable lake documentation and counsel during the course of the Survey. John Vogt, Chief of the Bureau of Environmental Health, Michigan Department of Public Health, and his staff were most helpful in identifying point sources and soliciting municipal participation in the Survey.

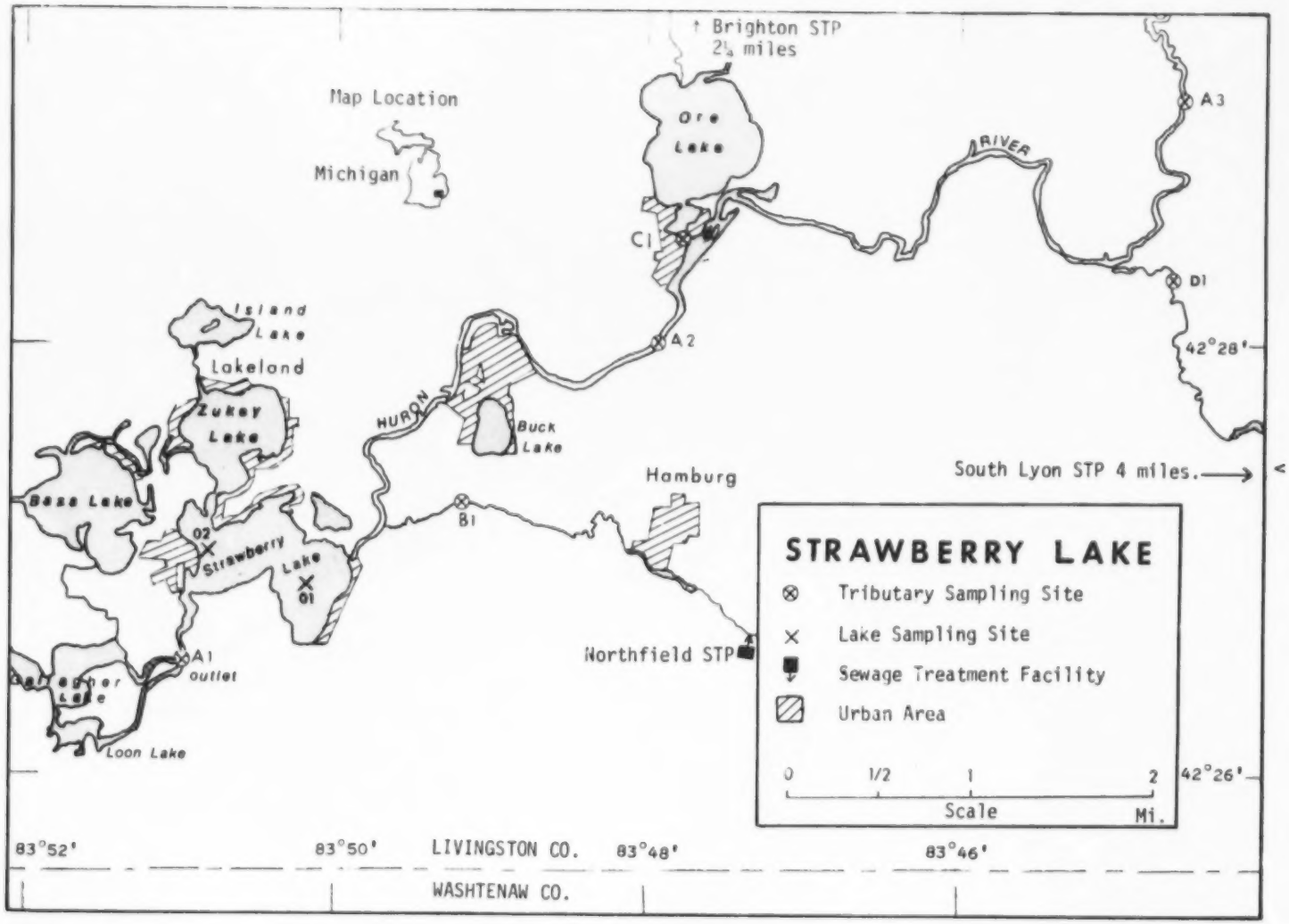
Major General Clarence A. Schnipke (Retired), then the Adjutant General of Michigan, and Project Officer Colonel Albert W. Lesky, who directed the volunteer efforts of the Michigan National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF MICHIGAN

LAKE NAME	COUNTY
Allegan Res.	Allegan
Barton	Kalamazoo
Belleville	Wayne
Betsie	Benzie
Brighton	Livingston
Caro Res.	Tuscola
Charlevoix	Charlevoix
Chemung	Livingston
Constantine Res.	St. Joseph
Crystal	Montcalm
Deer	Marquette
Ford	Washtenaw
Fremont	Newago
Higgins	Roscommon
Holloway Res.	Genesee, Lapeer
Houghton	Roscommon
Jordon	Ionia, Barry
Kent	Oakland
Long	St. Joseph
Macatawa	Ottawa
Manistee	Manistee
Mona	Muskegon
Muskegon	Muskegon
Pentwater	Oceana
Pere Marquette	Mason
Portage	Houghton
Randall	Branch
Rogers Pond	Mecosta
Ross	Gladwin
St. Louis Res.	Gratiot
Sanford	Midland
Strawberry	Livingston
Thompson	Livingston
Thornapple	Barry
Union	Branch
White	Muskegon


Brighton STP
2¼ miles
Map Location
Michigan
Ore Lake
A3
RIVER
C1
D1
Island Lake
Lakeland
A2
42°28'
Zukey Lake
HURON
Buck Lake
Base Lake
Hamburg
South Lyon STP 4 miles.
B1
02
Strawberry Lake
01
A1
outlet
Northfield STP
Loon Lake
STRAWBERRY LAKE
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Urban Area
0 1/2 1 2
Scale Mi.
42°26'
83°52'
83°50'
LIVINGSTON CO.
83°48'
83°46'
WASHTENAW CO.

STRAWBERRY LAKE

STORET NO. 2599

I. CONCLUSIONS

A. Trophic Condition:

Survey data and the records of others show that Strawberry Lake is eutrophic. Of the 35 Michigan lakes sampled in November when essentially all were well-mixed, 19 had less mean total phosphorus, 17 had less mean inorganic nitrogen, and 22 had less mean dissolved phosphorus; of the 41 lakes sampled, 19 had less mean chlorophyll a, and ten had greater mean Secchi disc transparency*.

During the September sampling, Survey limnologists noted an intensive algal bloom and depletion of dissolved oxygen at 20 feet and deeper accompanied by a hydrogen sulfide odor.

B. Rate-Limiting Nutrient:

The algal assay results show that Strawberry Lake was nitrogen limited at the time the assay sample was collected (09/19/72). The lake data indicate nitrogen limitation at all sampling times.

C. Nutrient Controllability:

1. Point sources--During the sampling year, Strawberry Lake received a total phosphorus load at a rate about 3½ times that

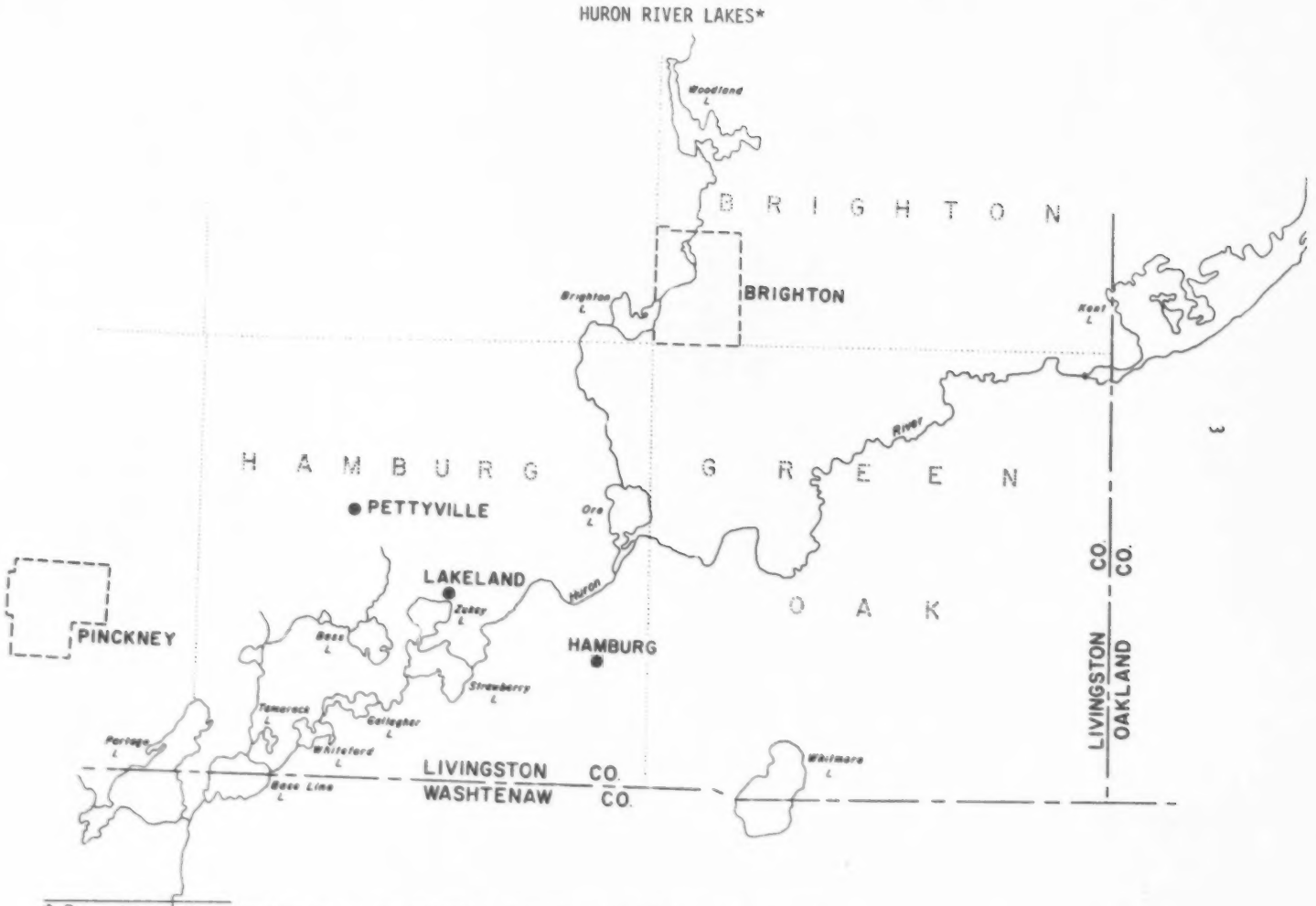
* See Appendix A.

proposed by Vollenweider (in press) as "dangerous" i.e., a eutrophic rate (see page 14). However, Vollenweider's model probably does not apply to water bodies with short hydraulic retention times, and the mean hydraulic retention time of Strawberry Lake is only 13 days. It is not likely that the model is applicable in this case.

It is calculated that the wastewater treatment plants serving Northfield Township and South Lyon contributed about 16% of the total phosphorus load reaching Strawberry Lake during the sampling year. Phosphorus removal is practiced at both plants, and it is calculated that about 80% removal was achieved during the period of effluent sampling (01/73-01/74 at Northfield and 02/73-02/74 at South Lyon).

Indirect point sources also contributed nutrients to Strawberry Lake during the sampling year. The City of Brighton impacted Brighton Lake in the upstream Ore Creek drainage, and the Village of Milford and the City of Wixom impacted Kent Lake in the upstream Huron River drainage (see map of the Huron River lakes, next page).

Phosphorus removal has been practiced at the Brighton wastewater treatment plant since the summer of 1970. However, during the Survey sampling year it appeared that a phosphorus wash-out occurred at Brighton Lake (see Working Paper No. 187,



* Reproduced with permission of the Michigan Department of Natural Resources

"Report on Brighton Lake"), and it is expected that the contribution from that drainage will be reduced once a new phosphorus equilibrium becomes established in Brighton Lake.

Also, it is calculated that Milford and Wixom collectively contributed 7,630 pounds of total phosphorus to Kent Lake during the sampling year (see Working Paper No. 199, "Report on Kent Lake"). Considering the rather minimal phosphorus retention in Kent Lake (23%), these point sources must have had a significant impact on downstream Strawberry Lake (e.g., if the retention of the treatment plant phosphorus in the lake was the same as the overall phosphorus retention, these two sources would have contributed nearly 5,900 pounds of phosphorus to the Huron River outlet of Kent Lake or about 37% of the Huron River "non-point" load at the inlet of Strawberry Lake.

Phosphorus removal was begun at the Milford wastewater treatment plant in August, 1973, and at the Wixon plant in September, 1974. Since the Survey sampling year ended in October, 1973, phosphorus removal at these plants would not have been reflected in the measured phosphorus loads to Strawberry Lake but will result in a reduction in that load

once a new phosphorus equilibrium becomes established in Kent Lake.

Considering the short hydraulic retention time of Strawberry Lake, it is believed that the phosphorus controls recently instituted in the Huron River basin, as noted above, will result in significant improvement in the trophic condition of this lake.

2. Non-point sources--During the sampling year, the phosphorus export rate of the Huron River at the inlet to Strawberry Lake was 53 pounds per square mile of drainage. By itself, this rate does not appear to be significantly higher than the export rates of other Michigan streams studied. However, the export rate of this river at the inlet to Kent Lake was only 45 $lbs/mi^2/yr$, and the export rate of Ore Creek at the inlet to Brighton Lake was only 32 $lbs/mi^2/yr$. It is believed the higher export rate at the Strawberry Lake inlet is attributable to the point sources impacting Kent Lake as discussed above.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS

A. Lake Morphometry†:

1. Surface area: 257 acres.
2. Mean depth: 22.1 feet.
3. Maximum depth: 50 feet.
4. Volume: 5,680 acre-feet.
5. Mean hydraulic retention time: 13 days.

B. Tributary and Outlet:
(See Appendix B for flow data)

1. Tributaries -

Name	Drainage area*	Mean flow*
Huron River	299.0 mi^2	184.2 cfs
Minor tributaries & immediate drainage -	53.6 mi^2	33.4 cfs
Totals	352.6 mi^2	217.6 cfs

2. Outlet -

Huron River	353.0 mi^2**	217.6 cfs**

C. Precipitation***:

1. Year of sampling: 32.6 inches.
2. Mean annual: 33.1 inches.

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† MI Cons. Dept. lake inventory map (1939).
* Drainage areas are accurate within ±5%; mean daily flows for 74% of the sampling sites are accurate within ±25% and the remaining sites up to ±40%; and mean monthly flows, normalized mean monthly flows, and mean annual flows are slightly more accurate than mean daily flows.
** Includes area of lake; outflow adjusted to equal sum of inflows.
*** See Working Paper No. 1, "Survey Methods, 1972".

III. LAKE WATER QUALITY SUMMARY

Strawberry Lake was sampled three times during the open-water season of 1972 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from two stations on the lake and from a number of depths at each station (see map, page v). During each visit, a single depth-integrated (15 feet or near bottom to surface) sample was composited from the two stations for phytoplankton identification and enumeration; and during the second visit, a single five-gallon depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 25 feet at station 1 and 34 feet at station 2.

The results obtained are presented in full in Appendix C, and the data for the fall sampling period, when the lake essentially was well-mixed, are summarized below. Note, however, the Secchi disc summary is based on all values.

For differences in the various parameters at the other sampling times, refer to Appendix C.

A. Physical and chemical characteristics:

		FALL VALUES (11/13/72)		
Parameter	Minimum	Mean	Median	Maximum
Temperature (Cent.)	6.5	6.8	6.9	7.0
Dissolved oxygen (mg/l)	8.4	8.5	8.5	8.5
Conductivity (μmhos)	395	458	460	500
pH (units)	7.7	7.8	7.8	7.8
Alkalinity (mg/l)	183	187	186	191
Total P (mg/l)	0.062	0.069	0.068	0.074
Dissolved P (mg/l)	0.045	0.050	0.051	0.053
NO_2 + NO_3 (mg/l)	0.190	0.200	0.200	0.210
Ammonia (mg/l)	0.300	0.367	0.380	0.400
		ALL VALUES		
Secchi disc (inches)	65	80	84	90

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Number per ml
06/17/72	1. Schroederia	434
	2. Dinobryon	217
	3. Cocconeis	163
	4. Melosira	127
	5. Cyclotella	109
	Other genera	116
	Total	1,166
09/19/72	1. Anabaena	1,131
	2. Microcystis	792
	3. Dinobryon	769
	4. Melosira	656
	5. Flagellates	498
	Other genera	1,268
	Total	5,114
11/13/72	1. Asterionella	1,834
	2. Flagellates	1,156
	3. Dinobryon	879
	4. Scenedesmus	653
	5. Melosira	628
	Other genera	1,709
	Total	6,859

2. Chlorophyll a -
(Because of instrumentation problems during the 1972 sampling, the following values may be in error by plus or minus 20 percent.)

Sampling Date	Station Number	Chlorophyll a (µg/l)
06/17/72	01	2.7
	02	5.2
09/19/72	01	16.5
	02	20.4
11/13/72	01	11.4
	02	10.5

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.084	0.696	16.9
0.010 P	0.094	0.696	16.3
0.020 P	0.104	0.696	15.9
0.050 P	0.134	0.696	16.3
0.050 P + 5.0 N	0.134	5.696	55.3
0.050 P + 10.0 N	0.134	10.696	52.0
10.0 N	0.084	10.696	43.3

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that the primary productivity of Strawberry Lake was quite high at the time the sample was collected. Also, the lack of yield response with additions of orthophosphate and the marked increase in yield when only nitrogen was

added indicate the lake was nitrogen limited at the time the sample was taken (09/19/72).

Nitrogen limitation is also indicated by the lake data; i.e., nitrogen to phosphorus ratios were 11 to 1 or less at all sampling times.

IV. NUTRIENT LOADINGS
(See Appendix D for data)

For the determination of nutrient loadings, the Michigan National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff month of April when three samples were collected. Sampling was begun in October, 1972, and was completed in October, 1973.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Michigan District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Since no unimpacted Strawberry Lake tributaries were sampled, nutrient loadings for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated by using the means of the nutrient loads, in $lbs/mi^2/year$, at stations B-1 and F-1 of nearby Holloway Reservoir and multiplying the means by the ZZ area in mi^2.

The operators of the South Lyon and Northfield Township wastewater treatment plants provided monthly effluent samples and corresponding flow data.

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* See Working Paper No. 1.

In the following tables, the nutrient loads attributed to the Huron River are those measured at station A-2 minus the measured South Lyon loads. All point-source nutrient loads were assumed to have reached the lake during the sampling year.

A. Waste Sources:

1. Known municipal† -

Name	Pop. Served	Treatment	Mean Flow (mgd)	Receiving Water
Northfield Township	3,300	trickling filter + P-removal	0.241	Horseshoe L. outlet to Huron River
South Lyon	2,675*	act. sludge + P-removal	0.321	Huron River

2. Known industrial - None

† Sprow, 1973; Howard, 1973.
* 1970 Census.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	lbs P/ yr	% of total
a. Tributaries (non-point load) -		
Huron River	15,690	74.5
b. Minor tributaries & immediate drainage (non-point load) -	1,850	8.7
c. Known municipal STP's -		
Northfield Township	1,700	8.1
South Lyon	1,660	7.9
d. Septic tanks* -	130	0.6
e. Known industrial - None	-	-
f. Direct precipitation** -	40	0.2
Total	21,070	100.0

2. Outputs -

Lake outlet - Huron River 16,420

3. Net annual P accumulation - 4,650 pounds

* Estimate based on 210 shoreline dwellings; see Working Paper No. 1.
** See Working Paper No. 1.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	lbs N/ yr	% of total
a. Tributaries (non-point load) -		
Huron River	388,760	75.4
b. Minor tributaries & immediate drainage (non-point load) -	89,990	17.4
c. Known municipal STP's -		
Northfield Township	15,760	3.1
South Lyon	13,740	2.7
d. Septic tanks* -	4,940	0.9
e. Known industrial - None	-	-
f. Direct precipitation** -	2,480	0.5
Total	515,670	100.0

2. Outputs -

Lake outlet - Huron River 449,670

3. Net annual N accumulation - 66,000 pounds

* Estimate based on 210 shoreline dwellings; see Working Paper No. 1.
** See Working Paper No. 1.

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

Tributary	lbs P/mi^2/yr	lbs N/mi^2/yr
Huron River	52	1,300

E. Yearly Loading Rates:

In the following table, the existing phosphorus loading rates are compared to those proposed by Vollenweider (in press). Essentially, his "dangerous" rate is the rate at which the receiving waters would become eutrophic or remain eutrophic; his "permissible" rate is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic rate would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with very short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
Units	Total	Accumulated	Total	Accumulated
lbs/acre/yr	82.0	18.1	2,006.5	255.8
grams/m^2/yr	9.19	2.03	224.9	28.8

Vollenweider loading rates for phosphorus (g/m^2/yr) based on mean depth and mean hydraulic retention time of Strawberry Lake:

"Dangerous" (eutrophic rate)	2.60
"Permissible" (oligotrophic rate)	1.30

V. LITERATURE REVIEWED

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Sprow, David L., 1973. Treatment plant questionnaire (Northfield Township and South Lyon wastewater treatment plants). MI Dept. Public Health, Lansing.

Willson, Ronald B., 1968. Investigation of nuisance algae conditions in the Huron River lakes, Livingston County. MI Dept. Nat. Resources, Lansing.

Vollenweider, Richard A. (in press). Input-output models. Schweiz. Z. Hydrol.

VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	FALL VALUES: MEAN TOTAL P	FALL VALUES: MEAN DISS P	FALL VALUES: MEAN INORG N	ALL VALUES: SOO-MEAN SEC	ALL VALUES: MEAN CHLUHA	ALL VALUES: 15-MIN UO
2640	HOLLOWAY RESERVOIR	0.062	0.043	1.461	439.375	10.678	9.200
2641	CARO RESERVOIR	0.117	0.022	3.835	473.000	11.967	9.500
2642	BOARDMAN HYDRO POND	0.006	0.005	0.358	363.500	1.267	6.600
2603	ALLEGAN LAKE	0.123	0.057	1.168	470.222	20.311	12.600
2606	BARTON LAKE	0.121	0.086	1.489	456.167	27.800	14.850
2609	BELLEVILLE LAKE	0.118	0.048	1.420	465.250	28.262	8.200
2610	BETSIE LAKE	0.025	0.008	0.273	461.667	4.567	7.400
2613	BRIGHTON LAKE	0.109	0.073	1.015	456.000	44.2[illegible]	7.500
2617	LAKE CHARLEVOIX	0.007	0.006	0.230	351.250	3.008	9.240
2618	LAKE CHEMUNG	0.044	0.014	0.132	404.333	13.483	14.800
2621	CONSTANTINE RESERVOIR	0.027	0.008	0.910	456.167	39.317	7.500
2629	FORD LAKE	0.105	0.058	1.536	456.167	14.733	14.000
2631	FREMONT LAKE	0.372	0.342	1.406	441.667	28.500	14.800
2640	JORDAN LAKE	0.180	0.144	1.998	427.667	20.517	14.900
2643	KENT LAKE	0.040	0.015	0.417	455.000	33.944	13.000
2648	LAKE MACATAWA	0.197	0.120	2.358	477.600	25.600	12.200
2649	MANISTEE LAKE	0.018	0.010	0.304	451.333	6.317	11.380
2659	MUSKEGON LAKE	0.087	0.043	0.469	436.444	9.511	14.800
2665	PENTWATER LAKE	0.027	0.017	0.496	430.667	16.083	14.800
2671	RANDALL LAKE	0.246	0.183	0.818	457.333	27.217	8.020
2672	ROGERS POND	0.026	0.015	0.183	435.500	8.133	9.600
2673	RUSS RESERVOIR	0.034	0.021	0.460	465.333	10.383	8.200
2674	SANFORD LAKE	0.016	0.008	0.307	458.750	13.791	8.300
2683	THORNAPPLE LAKE	0.042	0.032	1.737	442.833	14.650	10.800
2685	UNION LAKE	0.083	0.064	1.252	455.500	15.667	8.200
2688	WHITE LAKE	0.027	0.019	0.367	417.778	9.211	13.400
2691	MONA LAKE	0.307	0.241	0.963	451.667	27.783	14.100
2692	LONG LAKE	0.163	0.148	0.749	418.400	10.067	13.600

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	FALL VALUES: MEAN TOTAL P	FALL VALUES: MEAN DISS P	FALL VALUES: MEAN INORG N	ALL VALUES: 500-MEAN SEC	ALL VALUES: MEAN CHLORA	ALL VALUES: 15-MIN DO
2693	ST LOUIS RESERVOIR	0.134	0.093	1.227	462.667	5.583	8.420
2694	CRYSTAL LAKE	0.009	0.006	0.164	380.000	2.986	13.000
2695	HIGGINS LAKE	0.007	0.005	0.058	268.500	1.043	9.400
2696	HOUGHTON LAKE	0.018	0.008	0.136	420.833	9.217	8.200
2697	THOMPSON LAKE	0.043	0.029	0.436	407.889	11.967	14.800
2698	PERE MARQUETTE LAKE	0.032	0.024	0.346	448.667	11.833	8.600
2699	STRAWBERRY LAKE	0.069	0.050	0.567	419.800	11.117	13.600

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	FALL VALUES: MEAN TOTAL P	FALL VALUES: MEAN DISS P	FALL VALUES: MEAN INORG N	ALL VALUES: SDD-MEAN SEC	ALL VALUES: MEAN CHLORA	ALL VALUES: 15-MIN DO	INDEX NO
2640	HOLLOWAY RESERVOIR	46 (16)	43 (15)	17 (6)	57 (20)	60 (21)	63 (22)	286
2641	CARO RESERVOIR	29 (10)	54 (19)	0 (0)	3 (1)	49 (17)	54 (19)	189
2642	BOARDMAN HYDRO POND	97 (34)	97 (34)	69 (24)	91 (32)	94 (33)	97 (34)	545
2603	ALLEGAN LAKE	20 (7)	31 (11)	31 (11)	6 (2)	29 (10)	40 (14)	157
2606	BARTON LAKE	23 (8)	20 (7)	14 (5)	29 (9)	14 (5)	3 (1)	103
2609	BELLEVILLE LAKE	26 (9)	37 (13)	20 (7)	11 (4)	11 (4)	79 (26)	184
2610	BETSIE LAKE	77 (27)	77 (27)	80 (28)	17 (6)	86 (30)	94 (33)	431
2613	BRIGHTON LAKE	31 (11)	23 (8)	34 (12)	34 (12)	0 (0)	90 (31)	212
2617	LAKE CHARLEVOIX	91 (32)	91 (32)	83 (29)	94 (33)	89 (31)	60 (21)	508
2618	LAKE CHEMUNG	49 (17)	71 (25)	94 (33)	86 (30)	46 (16)	11 (2)	357
2621	CONSTANTINE RESERVOIR	71 (25)	83 (29)	40 (14)	29 (9)	3 (1)	90 (31)	316
2629	FORD LAKE	34 (12)	29 (10)	11 (4)	29 (9)	37 (13)	23 (8)	163
2631	FREMONT LAKE	0 (0)	0 (0)	23 (8)	54 (19)	9 (3)	11 (2)	97
2640	JORDAN LAKE	11 (4)	11 (4)	6 (2)	69 (24)	26 (9)	0 (0)	123
2643	KENT LAKE	57 (20)	69 (24)	63 (22)	40 (14)	6 (2)	36 (12)	271
2648	LAKE MACATAWA	9 (3)	14 (5)	3 (1)	0 (0)	23 (8)	43 (15)	92
2649	MANISTEE LAKE	80 (28)	74 (26)	77 (27)	46 (16)	80 (28)	46 (16)	403
2659	MUSKEGON LAKE	37 (13)	40 (14)	54 (19)	60 (21)	69 (24)	11 (2)	271
2665	PENTWATER LAKE	69 (24)	63 (22)	51 (18)	66 (23)	31 (11)	11 (2)	291
2671	RANDALL LAKE	6 (2)	6 (2)	43 (15)	23 (8)	20 (7)	86 (30)	184
2672	ROGERS POND	74 (26)	66 (23)	86 (30)	63 (22)	77 (27)	51 (18)	417
2673	ROSS RESERVOIR	60 (21)	57 (20)	57 (20)	9 (3)	63 (22)	79 (26)	325
2674	SANFORD LAKE	86 (30)	80 (28)	74 (26)	20 (7)	43 (15)	71 (25)	374
2683	THORNAPPLE LAKE	54 (19)	46 (16)	9 (3)	51 (18)	40 (14)	49 (17)	249
2685	UNION LAKE	40 (14)	26 (9)	26 (9)	37 (13)	34 (12)	79 (26)	242
2688	WHITE LAKE	66 (23)	60 (21)	66 (23)	80 (28)	74 (26)	31 (11)	377
2691	MONA LAKE	3 (1)	3 (1)	37 (13)	43 (15)	17 (6)	20 (7)	123
2692	LONG LAKE	14 (5)	9 (3)	46 (16)	77 (27)	66 (23)	27 (9)	239

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	FALL VALUES: MEAN TOTAL P	FALL VALUES: MEAN DISS P	FALL VALUES: MEAN INORG N	ALL VALUES: 500-MEAN SEC	ALL VALUES: MEAN CHLORA	ALL VALUES: 15-MIN DO	INDEX NO
2693	ST LOUIS RESERVOIR	17 (6)	17 (6)	29 (10)	14 (5)	83 (29)	69 (24)	229
2694	CRYSTAL LAKE	89 (31)	89 (31)	89 (31)	89 (31)	91 (32)	36 (12)	483
2695	HIGGINS LAKE	94 (33)	94 (33)	97 (34)	97 (34)	97 (34)	57 (20)	536
2696	HOUGHTON LAKE	83 (29)	86 (30)	91 (32)	71 (25)	71 (25)	79 (26)	481
2697	THOMPSON LAKE	51 (18)	49 (17)	60 (21)	83 (29)	51 (18)	11 (2)	305
2698	PERE MARQUETTE LAKE	63 (22)	51 (18)	71 (25)	49 (17)	54 (19)	66 (23)	354
2699	STRAWBERRY LAKE	43 (15)	34 (12)	49 (17)	74 (26)	57 (20)	27 (9)	284

APPENDIX B

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR MICHIGAN 2/3/75

LAKE CODE 2699 STRAWBERRY LAKE

TOTAL DRAINAGE AREA OF LAKE(SQ MI) 353.00

TRIBUTARY	SUB-DRAINAGE AREA(SQ MI)	NORMALIZED FLOWS(CFS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
2699A1	353.00	214.00	228.00	372.00	349.00	303.00	191.00	140.00	117.00	113.00	149.00	221.00	213.00	217.40
2699A2	299.00	181.00	193.00	315.00	296.00	257.00	162.00	119.00	99.40	95.40	126.00	187.00	180.00	184.15
2699ZZ	54.00	32.70	34.90	56.90	53.50	46.40	29.30	21.50	18.00	17.20	22.80	33.80	33.50	33.36

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 353.00
SUM OF SUB-DRAINAGE AREAS = 353.00
TOTAL FLOW IN = 2611.30
TOTAL FLOW OUT = 2610.00

MEAN MONTHLY FLOWS AND DAILY FLOWS(CFS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
2699A1	10	72	173.00	29	290.00				
	11	72	333.00						
	12	72	354.00	2	343.00				
	1	73	477.00	7	758.00				
	2	73	369.00	4	441.00				
	3	73	664.00	4	359.00				
	4	73	481.00	6	510.00	21	412.00	22	432.00
	5	73	343.00	20	294.00				
	6	73	395.00	2	441.00				
	7	73	249.00	7	341.00				
	8	73	223.00	4	219.00				
	9	73	124.00	8	104.00				
	10	73	169.00	13	133.00				
2699A2	10	72	147.00	29	246.00				
	11	72	282.00						
	12	72	300.00	2	291.00				
	1	73	404.00	7	642.00				
	2	73	313.00	4	374.00				
	3	73	563.00	4	304.00				
	4	73	408.00	6	432.00	21	349.00	22	366.00
	5	73	291.00	20	249.00				
	6	73	335.00	2	374.00				
	7	73	211.00	7	289.00				
	8	73	189.00	4	186.00				
	9	73	105.00	8	88.00				
	10	73	143.00	13	113.00				

TRIBUTARY FLOW INFORMATION FOR MICHIGAN 2/3/75

LAKE CODE 2699 STRAWBERRY LAKE

MEAN MONTHLY FLOWS AND DAILY FLOWS(CFS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
269922	11	72	51.00						
	12	72	54.00						
	1	73	73.00						
	2	73	57.00						
	3	73	102.00						
	4	73	74.00						
	5	73	53.00						
	6	73	61.00						
	7	73	38.00						
	8	73	34.00						
	9	73	19.00						
	10	73	26.00						

APPENDIX C

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 75/02/04

269901
42 27 00.0 083 50 00.0
STRAWBERRY LAKE
26 MICHIGAN

11EPALES
4

2111202
0022 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3-N TOTAL MG/L	00665 PHOS-TOT MG/L P	00666 PHOS-DIS MG/L P
72/06/17	08 45	0000	21.1	9.6	90	575	8.28	196	0.030	0.040	0.034	0.026
	08 45	0015	16.4	1.8		570	7.55	194	0.060	0.200	0.055	0.038
72/09/19	13 00	0000				475	8.60	160	0.040	0.060	0.068	0.033
	13 00	0004	21.1	8.9		470	8.50	175	0.060	0.070	0.060	0.034
	13 00	0015	19.7	3.3		500	7.80	184	0.040	0.070	0.035	0.026
	13 00	0021	15.0	0.0		560	7.50	236	0.060	1.630	0.437	0.316
	13 00	0025	12.3									
72/11/13	08 25	0000			72	500	7.70	184	0.200	0.350	0.062	0.050
	08 25	0004	6.5	8.5		470	7.70	185	0.200	0.350	0.068	0.048
	08 25	0010	6.6	8.5		470	7.70	185	0.210	0.300	0.068	0.045

DATE FROM TO	TIME OF DAY	DEPTH FEET	32217 CHLRPHYL A UG/L
72/06/17	08 45	0000	2.7J
72/09/19	13 00	0000	16.5J
72/11/13	08 25	0000	11.4J

J VALUE REPORTED IS ESTIMATION

STORET RETRIEVAL DATE 75/02/04

269902
42 27 00.0 083 51 00.0
STRAWBERRY LAKE
26 MICHIGAN

11EPALES 2111202
4 0036 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3-N TOTAL MG/L	00665 PHOS-TOT MG/L P	00666 PHOS-DIS MG/L P
72/06/17	09 00	0000	21.0	9.4	90	560	8.28	192	0.030	0.030	0.026	0.019
	09 00	0015	16.3	1.4		530	7.52	193	0.020	0.440	0.131	0.089
	09 00	0030	8.7	5.4		545	7.42	196	0.070	0.860	0.373	0.261
72/09/19	13 30	0000			65	460	8.70	171	0.030	0.060	0.028	0.018
	13 30	0004	21.8	11.3		480	8.70	171	0.040	0.060	0.041	0.023
	13 30	0015	19.9	3.2		495	7.90	178	0.030	0.070	0.064	0.032
	13 30	0025	12.8	0.0		570	7.50	210	0.090	2.130	0.444	0.442
	13 30	0034	9.1	0.0		600	7.20	248	0.040	7.010	1.340	1.320
72/11/13	08 00	0000			84	395	7.80	183	0.200	0.380	0.068	0.053
	08 00	0004	6.9	8.5		460	7.80	186	0.200	0.390	0.069	0.051
	08 00	0015	7.0	8.5		460	7.80	189	0.190	0.380	0.072	0.051
	08 00	0020	7.0	8.5		460	7.80	191	0.200	0.400	0.074	0.052
	08 00	0027	7.0	8.4		450	7.80	189	0.200	0.390	0.074	0.052

28

DATE FROM TO	TIME OF DAY	DEPTH FEET	32217 CHLRPHYL A UG/L
72/06/17	09 00	0000	5.2J
72/09/19	13 30	0000	20.4J
72/11/13	08 00	0000	10.5J

J VALUE WAS TO BE [illegible]

APPENDIX D

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 75/02/04

2699A1 LS2699A1
42 26 30.0 083 51 00.0
HURON RIVER OUTLET
26105 7.5 HAMBURG
U/STRAWBERRY LAKE
BANK .3 MI NE OF STRAWBERRY LK RD
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/10/24	13 50		0.170	1.250	0.350	0.105	0.147
72/12/02	13 00		0.220	1.350	0.240	0.039	0.067
73/01/07	09 50		0.570	1.980	0.198	0.020	0.044
73/02/04	09 15		0.360	0.600	0.099	0.017	0.040
73/03/04	13 50		0.315	0.690	0.105	0.015	0.040
73/04/06	10 36		0.180	0.620	0.025	0.005K	0.025
73/04/21	09 45		0.027	0.840	0.017	0.005K	0.030
73/04/22	11 00		0.030	0.990	0.030	0.005K	0.030
73/05/20	12 35		0.010K	0.840	0.020	0.006	0.035
73/06/02	09 30		0.039	0.905	0.031	0.009	0.030
73/07/07	13 15		0.044	0.790	0.019	0.007	0.035
73/08/04	09 30		0.058	0.840	0.034	0.010	0.035
73/10/13	10 30		0.058	1.050	0.046	0.005K	0.025

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/02/04

2699A2 L52699A2
42 26 00.0 083 48 00.0
HURON RIVER
26 7.5 HAMBURG
T/STRAWBERRY LAKE
WINANS LK RD BRDG N OF HAMBURG
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/10/29	12 55		0.182	1.200	0.250	0.039	0.088
72/12/02	10 20		0.200	1.175	0.220	0.026	0.054
73/01/07	09 20		0.660	3.500	0.189	0.019	0.042
73/02/04	10 00		0.340	0.520	0.044	0.008	0.025
73/03/04	14 15		0.350	0.690	0.060	0.007	0.030
73/04/06	10 00		0.210	0.530	0.031	0.005K	0.025
73/04/21	09 35		0.070	1.150	0.084	0.007	0.045
73/04/22	11 35		0.062	1.150	0.066	0.010	0.060
73/05/20	12 55		0.040	1.150	0.039	0.007	0.035
73/06/02	09 10		0.064	0.840	0.039	0.011	0.035
73/07/07	13 10		0.110	0.970	0.044	0.012	0.055
73/08/04	09 10		0.120	0.880	0.056	0.016	0.050
73/09/08	11 30		0.080	1.200	0.060	0.009	0.060
73/10/13	10 00		0.034	0.580	0.066	0.012	0.040

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/02/04

2699A3 LS2699A3
42 29 00.0 083 44 30.0
HURON RIVER
26 7.5 SOUTH LYON
T/STRAWBERRY LAKE
MCCABE RD BRDG IN ISLAND ST PK RECR AREA
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/10/29	10 30		0.169	1.400	0.273	0.016	0.054
72/12/02	13 00			2.600		0.006	0.029
73/01/07	10 30		0.357	1.680	0.168	0.005K	0.024
73/02/04	13 30		0.252	0.440	0.066	0.005K	0.025
73/03/04	10 30		0.280	0.680	0.064	0.005K	0.035
73/04/06	11 00		0.138	0.780	0.033	0.005K	0.040
73/04/21	10 10		0.056	1.050	0.013	0.007	0.060
73/04/22	12 07		0.054	0.880	0.014	0.007	0.025
73/05/20	12 15		0.032	1.100	0.021	0.009	0.047
73/06/02	10 15		0.042	0.950	0.072	0.012	0.045
73/07/07	13 45		0.132	1.180	0.060	0.014	0.060
73/08/04	10 15		0.190	1.050	0.056	0.023	0.070
73/09/08	10 30		0.115	0.890	0.036	0.014	0.085
73/10/13	10 45		0.081	0.860	0.058	0.005K	0.050

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/02/04

269981 LS269981
42 27 00.0 083 49 30.0
UNNAMED TRIB TO HURON RIVER
26 7.5 HAMBURG
T/STRAWBERRY LAKE
BRDG ENE OF LAKE .2 MI S OF BUCK LAKE
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/10/29	14 10		0.470	1.750	0.198	0.220	0.300
72/12/02	13 45		0.574	1.450	0.240	0.220	0.300
73/01/07	10 00		1.200	1.470	0.120	0.038	0.075
73/02/04	09 30		0.460	0.940	0.085	0.039	0.065
73/03/04	14 00		0.460	1.320	0.130	0.052	0.115
73/04/06	10 30		0.198	0.750	0.036	0.030	0.065
73/04/21	09 50		0.180	1.100	0.024	0.050	0.100
73/04/22	11 50		0.240	1.050	0.038	0.083	0.131
73/05/20	12 45		0.260	1.470	0.033	0.061	0.100
73/06/02	09 45		0.175	1.200	0.044	0.072	0.090
73/07/07	13 30		0.357	1.800	0.042	0.098	0.198
73/08/04	09 40		0.860	1.300	0.036	0.132	0.260
73/09/08	11 30		2.060	0.950	0.069	0.277	0.400

STORET RETRIEVAL DATE 75/02/04

2699C1 LS2699C1
42 28 30.0 083 48 00.0
ORE LAKE OUTLET
26 7.5 HAMBURG
T/STRAWBERRY LAKE
BRDG BETWEEN ORE LK AND HURON RIVER
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/10/29	13	15	0.160	1.500	0.770	0.273	0.320
72/12/02	10	35	0.150	2.900	0.950	0.360	0.470
73/01/07	09	00	0.270	1.050	0.560	0.132	0.164
73/02/04	10	30	0.320	0.760	0.140	0.032	0.060
73/03/04	14	20	0.290	1.050	0.336	0.066	0.095
73/04/06	10	00	0.160	0.790	0.017	0.007	0.045
73/04/21	09	30	0.070	0.780	0.099	0.021	0.035
73/04/22	11	30	0.015	0.860	0.009	0.007	0.040
73/05/20	13	10	0.052	1.320	0.072	0.017	0.030
73/06/02	09	00	0.042	0.630	0.072	0.011	0.020
73/07/07	13	00	0.016	0.780	0.012	0.011	0.030
73/08/04	09	00	0.099	0.830	0.033	0.022	0.037
73/09/04	11	45	0.010	0.920	0.018	0.016	0.050
73/10/13	09	45	0.010K	0.750	0.027	0.005K	0.040

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/02/04

269901 LS269901
42 28 00.0 083 44 30.0
UNNAMED TRIB TO HURON RIVER
26 7.5 SOUTH LYON
T/STRAWBERRY LAKE
SILVER LK RD BRDG 1 MI W OFGREEN OAK LK
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/10/29	10	38	0.082	1.050	0.099	0.006	0.044
72/12/02	10	30	0.250	1.610	0.230	0.012	0.052
73/01/07	09	30	1.640	1.700	0.092	0.009	0.035
73/02/04	10	45	0.880	0.800	0.026	0.005K	0.020
73/03/04	10	00	0.198	0.540	0.032	0.008	0.020
73/04/06	10	15	0.400	0.750	0.031	0.005K	0.015
73/04/21	10	05	0.126	1.200	0.046	0.005	0.035
73/04/22	12	05	0.220	1.050	0.063	0.007	0.035
73/05/20	12	20	0.078	2.600	0.080	0.006	0.025
73/06/02	10	00	0.058	1.050	0.050	0.009	0.030
73/07/07	13	40	0.050	1.050	0.048	0.008	0.045
73/08/04	10	00	0.042	1.210	0.038	0.017	0.035
73/09/08	10	50	0.060	1.130	0.065	0.006	0.025
73/10/13	10	15	2.100	1.260	0.115		

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/02/04

264950 P0264950 P0033300
42 27 00.0 083 48 00.0
NORTHFIELD TOWNSHIP
26105 7.5 HAMBURG
T/STRAWBERRY LAKE
UNNAMED STREAM
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/01/29	08 00								
CP(T)-			8.900	18.900	12.100	1.865	2.250	0.241	0.244
73/01/29	16 00								
73/02/02	08 00		6.900	7.400	0.690	1.925	2.400	0.238	0.248
73/03/05	08 00								
CP(T)-			9.400	10.500	3.100	2.775	2.880	0.245	0.249
73/03/05	16 00								
73/04/10	08 00								
CP(T)-			5.700	12.000	2.100	1.700	2.500	0.288	0.290
73/04/10	16 00								
73/05/23	08 00								
CP(T)-			8.400	12.000	4.100	1.790	2.400	0.256	0.250
73/05/23	16 00								
73/06/18	08 00								
CP(T)-			1.900	3.100	0.450	1.370	1.900	0.251	0.249
73/06/18	16 00								
73/07/17	08 00								
CP(T)-			12.600	6.400	1.150	2.100	2.950	0.217	0.253
73/07/17	16 00								
73/08/08	08 00								
CP(T)-			14.000	8.800	3.360	1.400	2.600	0.223	0.243
73/08/08	16 00								
73/09/25	08 00								
CP(T)-			14.600	8.400	2.730	1.800	2.300	0.222	0.220
73/09/25	16 00								
73/10/15	08 00								
CP(T)-			12.400	15.500	4.700	1.150	2.400	0.229	0.223
73/10/15	16 00								
73/11/14	08 00								
CP(T)-			14.600	21.000	5.700	1.600	2.700	0.227	0.214
73/11/14	16 00								
73/12/12	08 00								
CP(T)-			11.200	8.100	3.200	1.600	1.900	0.238	0.220
73/12/12	16 00								
74/01/28			5.900	11.200	2.400	0.930	1.250	0.313	0.234

STORET RETRIEVAL DATE 75/02/04

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                                                    269951          PU269951      P003500
                                                    42 27 30.0 083 39 30.0
                                                    SOUTH LYON
                                                    26      7.5 SOUTH LYON
                                                    T/STRAWBERRY LAKE
                                                    UNNAMED STREAM
                                                    11EMALES                  2141204
                                                    4                         0000 FEET  DEPTH
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DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/02/02	07 30								
CP(T)-			0.280	13.200	5.300	0.415	0.740	0.276	0.305
73/02/02	15 30								
73/02/27	08 00								
CP(T)-			1.370	15.000	4.700	0.400	1.300	0.260	0.252
73/02/27	15 00								
73/03/26	08 00								
CP(T)-			1.580	11.500	1.300	0.800	2.300	0.451	0.350
73/03/26	15 30								
73/04/25	08 00								
CP(T)-			0.500	1.600	0.550	0.690	1.100	0.360	0.370
73/04/25	15 30								
73/05/07	08 00								
CP(T)-			0.200	4.400	0.680	1.160	1.930	0.400	0.360
73/05/07	15 00								
73/06/25	08 00								
CP(T)-			3.200	7.900	0.100	1.200	2.000	0.300	0.345
73/06/25	15 00								
73/07/27	08 00								
CP(T)-			0.900	5.200	0.160	0.870	1.400	0.320	0.340
73/07/27	15 00								
73/09/27	08 00								
CP(T)-			0.270	14.000	7.550	0.570	0.970	0.300	0.292
73/09/27	15 00								
73/10/30	08 00								
CP(T)-			2.400	15.500	3.150	0.780	1.150	0.275	0.276
73/10/30	15 00								
73/12/05	08 00								
CP(T)-			0.550	21.000	9.000	0.540	1.000	0.310	0.249
73/12/05	15 00								
73/12/31	08 00								
CP(T)-			2.100	14.500	1.500	0.450	1.550	0.303	0.300
73/12/31	16 00								
74/01/31	08 00								
CP(T)-			[illegible]	[illegible]	[illegible]	0.450	0.800	0.400	0.375
74/01/31	15 00								

STORET RETRIEVAL DATE 74/02/20

259951 P0269951 P003500
42 27 30.0 083 34 30.0
SOUTH LYON
26 7.5 SOUTH LYON
T/STRAWBERRY LAKE
UNNAMED STREAM
TIEPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00623 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/02/20 CP(T)- 74/02/20	08 00 15 30		2.500	0.100	2.000	0.190	0.550	0.350	0.360

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